

Sub 21 22. (New) The apparatus of claim 20, wherein the downlink signal is a data signal.

Sub 23 23. (New) The apparatus of claim 20, further comprising:

a pilot signal processor, coupled with the transmit circuitry, to generate a plurality of pilot signals.

REMARKS

Applicants respectfully request reconsideration of the above referenced U.S. Patent application. With this amendment, claim 1 has been amended simply to remove unnecessary language identified therein. It will be appreciated that such amendments were not necessitated by the cited references, nor were they made to further distinguish the claimed invention over the cited references. Claims 8-23 have been added to capture embodiments of the invention to which Applicant is entitled. Thus, claims 1-23, as selectively amended, are pending.

Claim Rejections – 35 U.S.C. § 102(b)

In paragraphs 1 and 2 of the Action, claims 1-3 were rejected under 35 U.S.C. § 102(b) as being unpatentable over an article entitled “Base Station Transmitter Antenna Arrays with Mobile to Base Feedback” by Derek Gerlach, et al. (Hereinafter “Gerlach”). In response, Applicant respectfully traverses the rejection of such claims.

Claim 1

Rejected claim 1 is generally drawn to a method to determine a cellular communication base station (BS) antennae array weight set corresponding to a subscriber unit including the feature(s) of:

transmitting a plurality of *pilot downlink signals* from the BS to the SU, each pilot downlink signal being processed with a different weight set than the other pilot downlink signals;
receiving a report signal for at least one of the pilot downlink signals; and
selecting a weight set from the plurality of weight sets based, at least in part, on the received report signal.

Thus, Applicants claim a method to determine a cellular communication base station antennae array weight set, wherein the report signal is for at least one of the **pilot** downlink signals.

In rejecting claim 1, the Action provides that a “probing signal is a type of ‘downlink pilot signal’.” This is simply not the case. Pilot signals are used in conventional wireless communication systems for limited functions, such as handoff control (i.e., between base stations) and power control. In performing such limited functions, the mobile unit measures certain attributes of the pilot signal and reports back to at least the base station issuing the pilot signal, for example, to effect the base station’s handoff control and power control features. In this regard, claim 1 discloses a method for establishing beamforming weights for an antenna array by leveraging a pre-existing system signal, i.e., the pilot signal, not necessarily requiring introduction of an additional control signal into the RF environment for the purpose of determining beamforming weights.

In contradistinction to the claimed invention of, for example, rejected claim 1, the Gerlach reference teaches the use of an additional “probing” signal to be utilized with a feedback mechanism in order to estimate a mobile’s received signal strength, from which weighting values are generated. The claimed invention, on the other hand, determines weights by exploiting, at least in part, a signal already present, namely, the pilot signal.

Well settled patent law requires that in order to anticipate a claim, a single reference must teach each and every element of the claim as presented in the claim. Applicants respectfully submit that insofar as the Gerlach reference does not teach or suggest the use of a pilot signal for determining weights, it fails to anticipate that which is claimed in rejected claim 1.

In light of at least the foregoing, Applicants respectfully request that the §102(b) rejection of claim 1 should be withdrawn.

Applicants note that claims 2 and 3 depend from claim 1. Thus, in addition to any independent basis for patentability, Applicants respectfully submit that claims 2 and 3 are similarly patentable over the Gerlach reference by virtue of at least such dependence on patentable claim 1. Accordingly, Applicant respectfully requests that the §102(b) rejection of claims 2 and 3 be withdrawn.

Claim Rejections – 35 U.S.C. § 103(a)

In **paragraphs 4 and 5**, claims 4-5 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gerlach. In response, Applicants respectfully traverse the rejection of such claims.

In accordance with MPEP §706.02(j), one of the requirements to establish a prima facie case of obviousness is that “the prior art reference (or references when combined) must teach or suggest all the claim limitations” (emphasis added) (see also MPEP §2143.03 et seq.). In this instance, as discussed above, none of the cited references suggests or even mention determining weights based at least in part on a pilot signal. Thus, the references fail, even in combination, to teach or suggest at least one claim limitation, and therefore fail to make obvious the claimed invention.

Moreover, Gerlach actually teaches away from that which is claimed in rejected claim 1. In particular, because Gerlach teaches the use of a probe signal, Gerlach teaches away from exploiting, at least in part, an existing signal—namely, a pilot signal—to determine weights. The claimed invention, in contrast, does not necessarily require the use of an additional probe signal, which may cause undesirable effects (e.g., additional system RF noise, additional complexity in a base station or terminal, etc.) Thus, one skilled in the art would not be motivated by the Gerlach reference to create that which is claimed in rejected claim 1. Accordingly, the Gerlach reference fails to render obvious at least this feature of the invention, as recited, for example, in claim 1.

Applicants note that claims 4 and 5 depend from patentable base claim 1 and are, therefore, likewise patentable over the Gerlach reference by virtue of at least such dependency. Accordingly, Applicants respectfully request that the §103(a) rejection of claims 4 and 5 be withdrawn.

In **paragraph 6** of the Action, claims 6 and 7 are rejected as being unpatentable over Gerlach in view of the Admitted Prior Art, pursuant to 35 USC §103(a). In response, Applicants respectfully traverse the rejection of such claims.

Applicants respectfully submit that, at least for the reasons discussed above, no suggestion or motivation exists in the Gerlach reference or the Admitted Prior Art to use pilot signal(s), at least in part, to establish weight sets for beamforming. Moreover, the citation in the Action to the Admitted Prior Art fails to cure the deficiencies in the Gerlach reference identified above, especially since Gerlach's introduction of probe signals that teach away from exploiting an existing pilot signal for weight determination. Accordingly, Applicants respectfully submit the Gerlach reference in view of Admitted Prior Art fail to make obvious the claimed invention as embodied in claim 1.

Applicants note that claims 6-7 depend from claim 1. Accordingly, in addition to any independent basis for patentability, Applicants respectfully submit that claims 6 and 7 are patentable over the cited references by virtue of at least their dependence on patentable base claim 1. Thus, Applicants respectfully request that the §103(a) rejection of claims 6 and 7 be withdrawn.

Applicants respectfully submit that newly added claims 8 and 19, each include at least one feature similar to those introduced in amended claim 1, which feature is neither taught nor suggested by the prior art. Thus, for arguments analogous to those presented above in claim 1, Applicants respectfully submit that newly introduced claims 8 and 19 are similarly patentable over the cited references. Moreover, in addition to any independent basis for patentability, claims 9-18 and 20-23 are likewise patentable over the cited references by virtue of at least their dependency on patentable base claims 8 or 19, respectively.

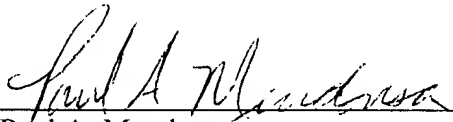
CONCLUSION

For at least the foregoing reasons, Applicants submit that claims 1-23, as selectively amended, are in condition for allowance and such action is earnestly solicited. The Examiner is respectfully requested to contact the undersigned by telephone if it is believed that such contact would further the examination of the present application.

Please charge any shortages and credit any overcharges to our Deposit Account number 02-2666.

Respectfully submitted,
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Appendix: Marked-up Version of Claims Denoting Amendments

1. (Amended) A method [for operating a first] to determine a cellular communication base station (BS) antennae array weight set corresponding to a subscriber unit (SU) [in a cellular communication system comprising a plurality of BSs for transmitting information to a subscriber unit (SU), said information being included in a downlink signal sent from said first BS, said first BS comprising an array of antennae, each antenna being coupled to a signal processing circuit that generates an antenna signal for that antenna by processing said downlink signal, said processing depending on a weight set that is utilized in generating individual signals to be sent on individual antennae in said array of antennae, said weight set depending on the location of said SU relative to said array of antennae, said cellular communication including at least one protocol in which said SU generates a report signal indicative of the signal quality received by said SU when said first BS transmits a pilot downlink signal, said method comprising a method of determining said weight set corresponding to said SU, said determination method] comprising [the steps of]:

transmitting a plurality of pilot downlink signals from [said first] the BS to [said] the SU, each pilot downlink signal [being] processed with a different weight set than the [others of said] other pilot downlink signals;

receiving [one of said] a report [signals] signal for at least [two] one of [said] the pilot downlink signals; and

[assigning said] selecting a weight set [for said SU] from the plurality of weight sets based, at least in part, on [said] the received report [signals] signal;

2. (Not Amended) The method of Claim 1 wherein a first one of said pilot downlink signals includes a first identifier.
3. (Not Amended) The method of Claim 2 wherein a second of said pilot downlink signals includes a second identifier that is different from said first identifier.
4. (Not Amended) The method of Claim 3 wherein said first and second identifiers identify first and second BS, said second BS being displaced from said first BS by a distance sufficient to assure that the pilot downlink signal transmitted by the first BS and containing said second identifier will not interfere with communications between said second BS and said SUs currently communicating with said second BS.
5. (Not Amended) The method of Claim 3 wherein said first pilot downlink signal identifies a first BS and wherein said SU also receives a third pilot downlink signal from a second BS, said SU generating and transmitting one of said report signals to said first BS, said report signal indicating the signal strength of said third pilot downlink signal and wherein said first BS determines whether to handoff said SU to said second BS based on the signal strengths reported for said first, second, and third pilot signals.

6. (Not Amended) The method of Claim 3 wherein said cellular communication conforms to a cellular standard in which each SU automatically monitors each of a plurality of pilot downlink signals in a set of pilot downlink signals defined in messages sent by said first BS to said SU, said SU generating one of said report messages when said SU determines that one of said pilot downlink signals in said set of pilot signals has a signal quality that exceeds a threshold value, said report message identifying said pilot downlink signal.
7. (Not Amended) The method of Claim 6 wherein said cellular standard is IS-95 and wherein said set of pilot downlink signals comprises one of said Candidate Set, Neighbor Set, or Remaining Set as defined in that standard.
8. (New) The method of claim 1, further comprising:

determining whether to hand off the SU to a second BS based, at least in part, on the received report signal.
9. (New) The method of claim 8, further comprising:

sending an estimate of the weight set to be used after handoff to the second BS.
10. (New) A machine-readable medium having stored thereon data representing sequences of instructions which, when executed by a processor, cause the processor to perform operations comprising:

transmitting a plurality of pilot downlink signals from a BS to a SU, each pilot downlink signal processed with a different weight set from the other pilot downlink signals;

receiving a report signal for at least one of the pilot downlink signals; and

selecting a weight set from the plurality of weight sets based, at least in part, on the received report signal.

11. (New) The machine-readable medium of claim 10, wherein a first one of the pilot downlink signals includes a first identifier.

12. (New) The machine-readable medium of claim 11, wherein a second of the pilot downlink signals includes a second identifier that is different from the first identifier.

13. (New) The machine-readable medium of claim 12, wherein the first and second identifiers identify first and second BSs, the second BS being displaced from the first BS by a distance sufficient to assure that the pilot downlink signal transmitted by the first BS and containing the second identifier will not interfere with communications between the second BS and the SUs currently communicating with the second BS.

14. (New) The machine-readable medium of claim 12, wherein the first pilot downlink signal identifies a first BS and wherein the SU also receives a third pilot downlink signal from a second BS, the SU generating and transmitting one of the report signals to the first BS, the report signal indicating the signal strength of the

third pilot downlink signal and wherein the first BS determines whether to handoff the SU to the second BS based on the signal strengths reported for the first, second, and third pilot signals.

15. (New) The machine-readable medium of claim 12, wherein the cellular communication conforms to a cellular standard in which each SU automatically monitors each of a plurality of pilot downlink signals in a set of pilot downlink signals defined in messages sent by the first BS to the SU, the SU generating one of the report messages when the SU determines that one of the pilot downlink signals in the set of pilot signals has a signal quality that exceeds a threshold value, the report message identifying the pilot downlink signal.

16. (New) The machine-readable medium of claim 15, wherein the cellular standard is IS-95 and wherein the set of pilot downlink signals comprises one of a Candidate Set, Neighbor Set, or Remaining Set.

17. (New) The machine-readable medium of claim 10, having stored thereon data representing sequences of instructions which, when executed by a processor, cause the processor to further perform the operation comprising:

determining whether to hand off the SU to a second BS based, at least in part, on the received report signal.

18. (New) The machine-readable medium of claim 17, having stored thereon data representing sequences of instructions which, when executed by a processor, cause the processor to further perform the operation comprising:

sending an estimate of the weight set to be used after handoff to the second BS.

19. (New) An apparatus comprising:

receive signal circuitry for connecting with an array of antennae, to receive at least one report signal, the report signal corresponding to at least one pilot signal; and

a transmit weight processor, coupled with the receive signal circuitry, to determine a weight set applied to a downlink signal based, at least in part, on the received report signal;

20. (New) The apparatus of claim 19, further comprising:

transmit circuitry, coupled with the transmit weight processor, to apply the determined weight set to beamform a downlink signal.

21. (New) The apparatus of claim 20, wherein the downlink signal is a pilot signal.

22. (New) The apparatus of claim 20, wherein the downlink signal is a data signal.

23. (New) The apparatus of claim 20, further comprising:

a pilot signal processor, coupled with the transmit circuitry, to generate a plurality of pilot signals.